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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/813,543

03/30/2004

F. Dan Gealy

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EXAMINER

CHEN, KEATH T

ART UNIT

PAPER NUMBER

1792

MAIL DATE

DELIVERY MODE

11/18/2008

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/813,543	Applicant(s) GEALY ET AL.	
	Examiner KEATH T. CHEN	Art Unit 1792	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 03 November 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 70-81 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 70-81 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>11/03/2008</u> | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 11/03/2008 has been entered.

Response to Amendment

1. Applicant's response, filed on 11/03/2008, in response to the rejection of claims 1-16 of the final office action mailed on 08/01/2008, by cancelling claims 1-16 and adding new claims 70-81 is acknowledged and will be addressed below.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 70-81 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to

one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Claim 70 recites the limitation of “liner ... to be lateral of edges of the substrate”, there is no support of this limitations in the claim. Substrate is described in Fig. 1 and liner is described in Fig. 2, but there is no reference to the relative position of substrate and liner in either Fig. 1 or Fig. 2.

3. Claim 76 and 80-81 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 76 recites the limitation "the first precursor gas" in line 2. There is insufficient antecedent basis for this limitation in the claim. Claim 76 will be examined as “a first precursor gas”.

Claim 80 recites “The apparatus of claim 70, wherein each of the electrodes ...” There is insufficient antecedent basis for this limitation in the claim. Claim 80 will be examined as “The apparatus of claim 79”.

Claim Rejections - 35 USC § 103

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

4. **Claims 70-71 and 73-77 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bennett et al. (US 5367139, hereafter '139), in view of Shinriki et al. (WO 02/15243, hereafter '243). (US 6806211, hereafter '211, is cited for corresponding English version of the '243).**

'139 teaches some limitations of:

Claim 70: An atomic layer deposition apparatus (Figs. 6 and 7, is capable of ALD) comprising: a chamber (#10, col. 9, lines 31-34) configured to receive substrate (wafer #32, col. 15, line 60) for deposition, the chamber having lateral inner walls (chamber wall #30, col. 15, line 52).

'139 further teaches a pulse generator #54 and power supplies #50-52 and, on the inner wall of the chamber, acoustic transducers/drivers #61 and #62 (col. 16, lines 18-29) which is also named piezoelectric transducers T #34 (col. 9, lines 17-19) in Fig. 1.

'139 does not explicitly teaches:

Claim 70: a piezoelectric liner proximate at least a portion of the one of the lateral inner walls, the liner being configured to be lateral of edges of the substrate upon receipt within the chamber; and at least a pair of acoustic wave drivers associated with the liner.

Claim 74: The apparatus of claim 70, wherein the piezoelectric liner is cylindrical.

Claim 75: The apparatus of claim 70, wherein the piezoelectric liner is a quartz liner.

'243 is an analogous art in the field of semiconductor processing (abstract), particularly in contamination (last paragraph of page 26, see also '211, col. 18, lines 48-52). '243 teaches quartz liners (Fig. 19, #202A-B, 2nd paragraph of page 26 or '211 col. 18, 2nd paragraph, and #201d, 2nd paragraph of page 27, or '211 col. 18, last

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paragraph), for the purpose of avoiding contamination (last paragraph of page 26 or '211, col. 18, lines 48-52). Note the liner is proximate of inner walls (#201) and lateral of edges of substrate (W, see Fig. 19).

At the time of the invention was made, it would have been obvious to a person of ordinary skill in the art to have added quartz/piezoelectric liner, as taught by '243, to the apparatus in Figs. 6-7 of '139, for the purpose/motivation of avoiding contamination. This quartz/piezoelectric liner obvious would have to be cylindrical shape to fit over the inner wall of chamber #30 in Fig. 7 of '139. Furthermore, to have moved the acoustic wave driver #61 and #62 from the chamber wall to the piezoelectric liner because it is well-known in the art that the contamination will be formed on the liner instead of the chamber wall when liner is deployed. (Note this well-known fact is treated as admitted prior art from now on, see MPEP 2144.03 B).

'139 further teaches the limitations of:

Claim 71: The apparatus of claim 70, wherein the acoustic wave driver (#61 and #62) is adapted to drive the surface acoustic wave in a selected range of frequencies (by using pulse generator #54, col. 16, lines 26-29; see also col. 11, lines 62-65).

Claim 73: The apparatus of claim 70, wherein the acoustic wave driver comprises at least one transducer (#61 or #62, col. 16, lines 18-21, see Applicants' specification, page 9, lines 13-14, acoustic wave drive is piezoelectric transducer).

Claim 76: The apparatus of claim 70, further comprising a pump (vacuum throat #31, col. 9, lines 31-34, see also col. 17, lines 58-61) coupled to the chamber (#10) and operable to evacuate a (the) first precursor gas from the chamber (Fig. 4, SiF₄, col. 18, line 12; However, gas identity is intended use in the apparatus claim).

Claim 77: The apparatus of claim 70, wherein the chamber is adapted to receive a second precursor gas (NF₃ or CF₄, col. 17, line 49. However, gas identity is considered intended use).

5. Claims 72 and 78-81 are rejected under 35 U.S.C. 103(a) as being unpatentable over '139 and '243, in view of Koinuma et al. (US 5569502, hereafter '502).

'139 and '243, together, teach all limitations of claims 70-71, as discussed above. '139 further teaches the use of piezoelectric acoustic transducer (col. 9, lines 17-19) on the chamber wall to produce pressure wave (col. 11, lines 28-37) to reduce particle contamination, the frequency is chosen to minimize the transduction impedance and to maximize the gettering of suspended particles (col. 11, lines 62-65) or the mass of particulates (col. 11, lines 23-27); or in using surface (col. 15, lines 18-21) acoustic wave in acoustic stress (col. 16, lines 14-32); and the surface acoustic wave and pressure wave can be combined (col. 17, lines 4-5); but is silent on the details of acoustic transducer design.

'139 does not teach the limitations of:

Claim 72: The apparatus of claim 71, wherein the selected range of frequencies is chosen from an overall range of about 100Hz to about 200 kHz.

Claim 78: The apparatus of claim 70, further comprising at least a pair of electrodes associated with at least one of the wave drivers.

Claim 79: The apparatus of claim 78, wherein one of the pair of electrodes is configured to operate at one polarity and the other of the pair of electrodes is configured to operate at another polarity opposite of the one polarity.

Claim 80: The apparatus of claim 79 (70?), wherein each of the electrodes comprises a conductive backbone having a plurality of conductive prongs extending therefrom.

Claim 81: The apparatus of claim 80, wherein each of the prongs of the electrodes defines a space therebetween and the pair of electrodes are aligned with one another having prongs of one electrode within the space of the other and prongs of the other electrode within the space of the one.

'502 is an analogous art in the field of semiconductor (col. 5, lines 35-36) deposition (plasma CVD and PVD, col. 5, lines 27-32; '139, col. 13, lines 3-12), particularly in detail of generation of surface acoustic wave (col. 2, lines 18-26). '502 teaches a pair of comb-shaped opposite polarity electrodes (Fig. 3, #32 and #32' on opposite side of source #33, col. 6, lines 1-6) on piezoelectric (#31 made of lithium niobate, col. 6, lines 1-3, is a piezoelectric, col. 4, lines 58-59) with frequency from 0.1 to 1000 Hz (col. 7, lines 64-66) to provide a surface acoustic wave (col. 2, lines 18-26).

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Note the comb shape electrodes have conductive (intrinsic of electrode) backbone and prongs aligned and interleaved with each other.

At the time of the invention was made, it would have been obvious to a person of ordinary skill in the art to have adopted the comb-shaped electrode pair, as taught by '502, to the piezoelectric acoustic transducer (T #34 in Fig. 1 or #61-62 in Figs. 6-7) of '139, as a suitable design for the piezoelectric acoustic transducer. The selection of something based on its known suitability for its intended use has been held to support a *prima facie* case of obviousness. MPEP 2144.07.

For claim 72, '139 discloses the claimed invention except for frequency range. It would have been obvious to a person having ordinary skill in the art at the time the invention was made to optimize the frequency range, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). The frequency is a result effective variable as taught by '139 (col. 11, lines 62-65).

Response to Arguments

Applicants did not file arguments in the submission of 11/03/2008.

Conclusion

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to KEATH T. CHEN whose telephone number is (571)270-1870. The examiner can normally be reached on 8-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Cleveland can be reached on 571-272-1418. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/K. T. C./
Examiner, Art Unit 1792

/Michael Cleveland/
Supervisory Patent Examiner, Art Unit 1792